NITROGEN

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Nitrogen is an essential element of life and a part of all plant and animal proteins. As a part of the deoxyribonucleic acid and ribonucleic acid molecules, nitrogen is an essential constituent of each individual's genetic blueprint. As an essential element in the chlorophyll molecule, nitrogen is vital to a plant's ability to photosynthesize. Some crop plants, such as alfalfa, soybeans, garden peas, and peanuts, can convert atmospheric nitrogen into a usable form in a process called fixation. Most nitrogen available for crop production, however, comes from decomposing animal and plant waste or from commercially produced fertilizers.

All commercial fertilizers contain their nitrogen in the ammonium and/or nitrate form or in a form that is quickly converted to these forms once the fertilizer is applied to the soil. Commercial production of anhydrous ammonia is based on reacting nitrogen with hydrogen under high temperatures and pressures. The source of nitrogen is air, which is almost 80% nitrogen. Hydrogen is derived from a variety of raw materials, including water, and crude oil, coal, or natural gas hydrocarbons. Other nitrogen fertilizers are produced from ammonia feedstocks through a variety of chemical processes. Small quantities of nitrates are produced from mineral resources principally in Bolivia and Chile.

In 2002, U.S. ammonia production was 10.8 million metric tons (Mt) of contained nitrogen, a 16% increase from the low level of production in 2001. Moderating natural gas prices for most of 2002, compared with those in 2001, resulted in production capacity that had been idled in 2001 returning to operation. Although the United States produced most of its ammonia requirements, the country had an import reliance of 28%, with most of the imports in 2002 coming from Canada, Trinidad and Tobago, and Ukraine. About 90% of the ammonia consumed in the United States was used in fertilizer applications.

Weak nitrogen pricing and a rapid rise in high natural gas costs in the first quarter of 2002 led many producers to cut back production. The largest U.S. ammonia producer filed for Chapter 11 bankruptcy in 2002, and three ammonia plants with a total capacity of 983,000 metric tons per year (t/yr) were permanently closed during the year. A new 645,000-t/yr ammonia plant began operating on a commercial scale in Trinidad and Tobago in July. Much of this plant's output was targeted to the U.S. market. Progress continued on planned ammonia plants in Australia, Egypt, Oman, and Trinidad and Tobago. In addition to the U.S. plants, the following were closed in 2002: a 140,000-t/yr plant in France, a 120,000-t/yr plant in India, a 530,000-t/yr plant in Ireland, and two plants totaling 660,000-t/yr capacity in the Republic of Korea. New ammonia plants were proposed in Bangladesh, Iran, Saudi Arabia, Trinidad and Tobago, and Turkmenistan.

Global ammonia production in 2002 increased by about 3% from that of 2001 to about 109 Mt of contained nitrogen. Increases in production in China and North America offset a decline in production in India. China, India, and the United States continued to be the principal producers, together accounting for about 47% of the total. In 2002, world urea production increased by about 6% to 51.4 Mt of contained nitrogen. China and India, the two largest producing countries, accounted for 48% of world production; production in China increased by about 10%, and production in India decreased by 2% compared with those of 2001. The United States and Canada produced about 10% of the total.

Legislation and Government Programs

In May, the International Trade Administration (ITA), U.S. Department of Commerce (DoC), initiated an antidumping investigation into imports of urea-ammonium nitrate (UAN) solutions from Belarus, Lithuania, Russia, and Ukraine. In April, the DoC received a petition from a coalition of U.S. UAN producers alleging that UAN was being imported into the United States at less than fair value. In June, the U.S. International Trade Commission (ITC) voted that UAN from Belarus, Russia, and Ukraine may have harmed U.S. producers. The ITC determined that imports from Lithuania were negligible, and therefore would not be subject to the antidumping duty (U.S. International Trade Commission, 2002). In October, the ITA set preliminary antidumping rates for the other three countries. For Belarus, the ITA set a dumping margin of 190.34% ad valorem (U.S. Department of Commerce, International Trade Administration, 2002a). For Russia, a duty of 138.95% ad valorem was set for JSC Nevinnomysski Azot, and a duty of 233.85% ad valorem was set as a Russia-wide rate (U.S. Department of Commerce, International Trade Administration, 2002b). For Ukraine, the antidumping duty was set at 193.58% ad valorem (U.S. Department of Commerce, International Trade Administration, 2002c). Final determinations on the above duty rates were scheduled to be completed in early 2003.

In June, the DoC designated Russia as a market economy, making it subject to the full scope of U.S. trade law and perhaps accelerating Russian accession to the World Trade Organization (WTO). As a consequence of the decision, Russia must comply with the countervailing duty law from which it has been exempted so far, and the DoC will be required to use Russian prices and costs, instead of data from a comparable surrogate market economy it has used until now, in any future antidumping investigation. The U.S. decision and a similar earlier European Union (EU) determination remove major legal obstacles to Russia's WTO entry (U.S.

Department of Commerce, 2002§[1]). This ruling, however, would not affect ongoing countervailing and antidumping duty investigations.

The Farm Security and Rural Investment Act of 2002 (2002 Farm Act), which governs Federal farm programs through 2007, was signed into law on May 13, 2002. The Act includes a wide range of agricultural programs, covering commodities, conservation, credit, energy, forestry, rural development, and trade. Although this new farm law introduces some new policies, in many ways, the 2002 Farm Act extends provisions of the 1996 Farm Act and the ad-hoc emergency spending bills of 1998 through 2001. Commodity policy changes include changing marketing assistance loan rates, adding countercyclical payments, and replacing production flexibility contract payments with direct payments. Also, the commodity coverage under these programs is expanded in the new legislation. The U.S. Department of Agriculture (USDA) completed an analysis of the legislation based on model simulations. The analysis shows that loan rate changes under the marketing assistance loan program of the 2002 Farm Act initially would result in an increase in total planted acreage of eight major program crops. This increase in plantings, however, is relatively small (less than 1%), partly because of the inelasticity of acreage response in the sector. In the longer run, the simulations indicated that overall plantings of the eight program crops studied would be lower under the 2002 Farm Act than under a continuation of the 1996 Farm Act. This result mostly reflected larger enrollment in the Conservation Reserve Program and increased plantings of dry peas and lentils, although planted acreage for the eight program crops was reduced by less than 0.6% (U.S. Department of Agriculture, Economic Research Service, 2002§).

The Safe Explosives Act was signed into law by the President on November 25, 2002. The Act adds three new categories of persons prohibited from receiving or possessing explosives—aliens (with limited exceptions), persons who have been dishonorably discharged from the military, and citizens of the United States who have renounced their citizenship. When requested by the Bureau of Alcohol, Tobacco and Firearms (ATF), manufacturers and importers of explosive materials, including ammonium nitrate, must submit samples of these materials to the ATF, as well as information on their chemical composition or other information. This will assist the ATF in the identification of explosives found at crime scenes. These changes became effective on January 24, 2003, and additional provisions for intrastate permits, enhanced background checks, and license inspections became effective on May 24, 2003 (U.S. Department of the Treasury, Bureau of Alcohol, Tobacco and Firearms, 2002§).

Production

Industry statistics for anhydrous ammonia and derivative products were developed by the U.S. Census Bureau. A summary of the production of principal inorganic fertilizers by quarter was reported in the series MQ325B, and industrial gases (including nitrogen) were reported in the quarterly report MQ325C. Final data for inorganic fertilizers were subsequently published in the companion annual report MA325B, and data for industrial gases were published in the annual report MA325C.

In 2002, production of anhydrous ammonia (82.2% nitrogen) increased by about 16% to 10.8 Mt of contained nitrogen compared with a revised figure of 9.35 Mt in 2001 (table 1). Of the total production, 90% was for use as a fertilizer; the remaining 10% was used in other chemical and industrial sectors (table 2).

The United States remained the world's second largest producer and consumer of elemental and fixed types of nitrogen following China. In declining order, urea, ammonium phosphates [diammonium phosphate (DAP), monoammonium phosphate (MAP), and other ammonium phosphates], ammonium nitrate, nitric acid, and ammonium sulfate were the major downstream products produced from ammonia in the United States. Their combined production was 10.1 Mt of contained nitrogen, with urea accounting for about 33% of the production (table 3). Of the urea produced in the United States in 2002, 43% was consumed in granular form, 33% was used for UAN production, 23% was consumed in prill form, and 1% was consumed in feedstock for other uses, such as melamine production.

Ammonia producers in the United States operated only at about 79% of design capacity; this percentage included capacities at plants that operated during any part of 2002. Of the plants that operated in 2002, more than 52% of total U.S. ammonia production capacity was concentrated in the States of Louisiana (32%), Oklahoma (14%), and Texas (6%) owing to large reserves of feedstock natural gas. Farmland Industries Inc., Terra Industries Inc., PCS Nitrogen Inc., CF Industries Inc., Agrium Inc., and Mississippi Chemical Corp., in declining order, accounted for 78% of total U.S. ammonia capacity (table 4).

Weak nitrogen pricing and a rapid increase natural gas costs in the first quarter of 2002 led many producers to cut back production. By the end of the first quarter, about 15% of the total U.S. ammonia production capacity was closed. By July, much of the idled capacity was returned to operation as ammonia prices had increased and natural gas prices had fallen. Although natural gas prices rose again later in the year, a corresponding increase in ammonia prices enabled producers to continue operating.

In May, Farmland Industries filed for Chapter 11 bankruptcy protection, citing adverse market conditions in the nitrogen fertilizer industry and recent cash demands as the reasons behind the filing. At the same time, the company decided to close its 470,000-t/yr Pollack, LA, ammonia plant and maintain its 420,000-t/yr Lawrence, KS, plant for limited use as a terminal. The company received $306 million in debtor-in-possession financing, which will allow it to continue to operate during the bankruptcy process (Green Markets, 2002e; Farmland Industries Inc., 2002§). On October 28, Farmland Industries asked for court approval to sell some of its assets, and in March 2003, Koch Nitrogen Co. won the auction for most of Farmland's nitrogen assets. Koch's purchase included Farmland's ammonia plants at Beatrice, NE; Dodge City, KS; Enid, OK; and Fort Dodge, IA, with a total capacity of 1.8 million metric tons per year (Mt/yr), Farmland's 50% ownership of the 675,000-t/yr Farmland-Mississippi Chemical joint-venture ammonia

[1]References that include a section mark (§) are found in the Internet References Cited section.

plant in Trinidad and Tobago, and 12 ammonia terminals. Farmland's Coffeyville, KS, plant was not included in the sale (Fertilizer Week America News Update, 2003). Mississippi Chemical was obligated to search for a buyer for its 50% of the Trinidad and Tobago plant. As a condition of renewing its revolving credit line, Mississippi Chemical was required by its lenders to actively market its equity interest in the plant (Fertilizer Week America, 2002a). At yearend, no buyer had been found.

In April, J.R. Simplot Co. announced that it would close its 93,000-t/yr ammonia plant in Pocatello, ID, citing global competition. The company had been considering either upgrading its current plant or building a new plant to meet its ammonia requirements for fertilizer production, but because of fluctuating natural gas prices, the company decided against these options. Simplot will import ammonia, mostly from the Far East, the Middle East, and Russia, for its needs and has secured long-term supply contracts and invested in port facilities along the west coast to bring ammonia to Pocatello (Green Markets, 2002i).

Mississippi Chemical announced in December that it would permanently close its 525,000-t/yr urea plant in Donaldsonville, LA, by the first quarter of 2003. The company had lost its largest industrial customer for urea melt, Melamine Chemicals Inc., when that company's plant was closed in early 2002. Melamine Chemicals had a contract through 2025 to purchase up to 190,000 t/yr of urea and 23,000 t/yr of ammonia from Mississippi Chemical. In addition, Mississippi Chemical cited continued pressure from natural gas prices as a contributing reason for the plant closure (Green Markets, 2002f). However, instead of completely closing the plant, Mississippi Chemical closed the prilled urea portion of its plant and, after purchasing Melamine Chemicals in April 2003, planned to supply the melamine operation with urea from the Donaldsonville plant (Mississippi Chemical Corp., 2003§).

In June, Agrium filed a lawsuit against Unocal Corp. claiming that Unocal withheld critical information about natural gas reserves and the size of the environmental liability during negotiations for the sale of the 1.25-Mt/yr Kenai, AK, ammonia plant in September 2000. Unocal subsequently filed a suit against Agrium claiming that Agrium was withholding payments that were agreed upon in the sale. According to Agrium, Unocal was to supply natural gas at $1.20 per million British thermal units from two fields with reserves of 453 billion cubic feet, which would be enough to supply the plant through 2009. However, estimates from Unocal were that the two fields would be sufficient to supply 80% of the plant's requirements for 2004 and 50% of its requirements for 2005. Unocal claimed that Agrium had not paid $16.6 million it owed to Unocal as an annual earn-out payment; Agrium was disuputing the method used to calculate the payment (Green Markets, 2002a). In November, Agrium reached a 30-day agreement with a major oil and gas producer in Cook Inlet, AK, for the supply of additional spot natural gas for the Kenai facility on an interruptible basis. This natural gas will supplement deliveries from Unocal; this agreement was renewed in December for an additional 30 days. Agrium said that the delivery of this gas will allow the plant to operate at rates averaging between 75% and 100% of capacity, depending upon Unocal's base supply (Agrium Inc., 2002a§, b§).

Environment

The ammonium and nitrate forms of nitrogen are highly soluble in water and are readily available for crop plant uptake. Ammonium is held by soil particles and, therefore, is not subject to movement down through the soil during periods of rainfall or irrigation. Nitrates, however, do move downward with soil water. This leaching process can lead to nitrate accumulation in ground water. As soils are warmed during the growing season, the ammonium form of nitrogen is subject to conversion to nitrate in a process called nitrification. Most of the ammonium not used by the crop is eventually converted to nitrate. Nitrogen stabilizers and nitrification inhibitors can slow the conversion of soil ammonium to nitrate. Best management practices to increase nitrogen use efficiency and to reduce nitrate leaching include application of fertilizer close to the time of actual crop use, multiple applications, terracing, grass waterways, and strip cropping.

Hypoxia in the Gulf of Mexico recently has become a controversial environmental concern for the fertilizer industry and an issue that spawned significant research efforts to determine its cause. "Hypoxia in the Gulf of Mexico" refers to the phenomenon that happens in an area along the Louisiana-Texas coast where water near the bottom of the Gulf contains less than 2 parts per million of dissolved oxygen. Hypoxia can cause stress or death in bottom-dwelling organisms that cannot move out of the hypoxic zone. Some studies postulated that nitrate runoff from fertilizers is the principal cause of hypoxia, while others cited other causes for the hypoxic zone.

In July 2002, researchers at the Louisiana Universities Marine Consortium measured the size of the Gulf of Mexico hypoxic zone. To complement these measurements, the U.S. Geological Survey (USGS) provided estimates of the flux of nutrients from the Mississippi Basin to the Gulf of Mexico. According to measurements, the size of the hypoxic zone in 2002 grew to 22,000 square kilometers (km^2). According to the researchers, the sequence of events that led to the hypoxia level in 2002 was a bit abnormal. Spring weather was windier than normal, and the two-layer system that supports hypoxia did not develop to its maximum strength until June, unlike other years when hypoxia happens earlier. In addition, the Mississippi River discharge, which stimulates the algal growth, peaked three times in 2002—February, April, and early June—pouring additional fresh water and nutrients into the Gulf at a critical time for the formation of summer hypoxia (Louisiana Universities Marine Consortium, 2002§; U.S. Geological Survey, 2002§). In 2001, The Mississippi River/Gulf of Mexico Watershed Nutrient Task Force completed a hypoxia action plan that called for reducing the size of the hypoxic zone to 5,000 km^2 by 2015 through reducing nitrogen loading from the Mississippi River by 30%.

Consumption

In 2002, apparent consumption of ammonia increased by 13% to 15.2 Mt of contained nitrogen. Apparent consumption is calculated as the production plus imports minus exports, adjusted to reflect any changes in stocks.

Consumption of nitrogen fertilizers in the United States for the 2002 crop year (ending June 30, 2002) is listed in table 5. Consumption of 11.0 Mt of contained nitrogen was about 4% higher than that of the revised figure for 2001. Anhydrous ammonia was the principal fertilizer product, representing 26% of fertilizer consumption.

Other uses of ammonia are in the production of amines, cyanides, and methyl methacrylate polymers (plexiglass); in liquid household and industrial cleaners; in industrial stack-gas scrubbing; in pulp and paper products; in industrial refrigeration; in metallurgy; and as a propellant in vehicular air bags.

Urea and UAN solutions constituted 43% of fertilizer consumption during the 2002 crop year. Urea is typically 45.9% nitrogen, and UAN solutions are typically 29.8% to 29.9% nitrogen. In the industrial sector, urea is used extensively as a protein supplement in ruminant animal feeds, in the production of urea-formaldehyde adhesives, and in the synthesis of plastics and resins.

Ammonium nitrate was used primarily in solid and liquid fertilizers, in industrial explosives, and as blasting agents. After World War II, ammonium nitrate became the leading solid nitrogen fertilizer in the United States and worldwide, and remained so until about 1975 when its use was surpassed by synthetic urea. Ammonium nitrate containing 33.9% nitrogen constituted 4% of 2002 nitrogen fertilizer consumption.

Ammonium sulfate was used mostly as a fertilizer material, valued for its nitrogen content (21.2% nitrogen) and its readily available sulfur content (24.3% sulfur). It is commonly produced as a byproduct of caprolactam production, an intermediate in nylon manufacture. Since the introduction of ammonium nitrate and urea as fertilizer materials, the relative importance of ammonium sulfate worldwide has steadily decreased. In the 2002 crop year, fertilizer consumption of ammonium sulfate, based on nitrogen content, was 2% of the total nitrogen-based fertilizer market. Nonfertilizer uses of ammonium sulfate include food processing, fire control, tanning, and cattle feed.

Nitric acid production is listed in table 3. Nitric acid is used in salt formation reactions to produce metal nitrates and in metal degreasing, treating, and pickling for the graphic and galvanic industries. Nitration reactions with benzene, phenol, and toluene produce dyestuffs, pharmaceutical products, trinitrotoluene explosives, and disinfectants. Esterification reactions with glycol, glycerol, and cellulose produce nitroglycerine explosives (dynamite), celluloid, and nitrocellulose lacquers. Oxidation reactions with toluene, p-xylene, and cyclohexanone produce polyurethanes and polyester fibers (nylon).

Elemental nitrogen is used extensively by the electronics, metals, food, and aerospace industries because of its inert and cryogenic properties. Nitrogen can be used to prevent fires and explosions, as a purging agent for cleaning and processing equipment, and as a controlling atmosphere for annealing and heat treating and other metal preparation processes where oxygenation is a concern.

Stocks

Stocks of ammonia at yearend 2002 were 0.77 Mt, a decrease of 16% from those at the end of 2001, according to data published by The Fertilizer Institute (TFI) (table 6). The U.S. Census Bureau reported ending stocks of ammonia to be 0.308 Mt in 2002, which was a less than one-half of those reported by TFI. The U.S. Census Bureau ending stocks for 2001 were 0.318 Mt; the difference between 2002 and 2001 yearend stocks reported by the U.S. Census Bureau was 3%. Although the USGS traditionally had used U.S. Census Bureau data in calculating apparent consumption, the calculation has been computed using TFI data to minimize irregularities caused by continually switching data series and using U.S. Census Bureau data when it is available—U.S. Census Bureau inventory data are occasionally withheld.

Transportation

Ammonia was transported by refrigerated barge, rail, pipeline, and truck. Three companies serve 11 States with 4,900 kilometers (km) of pipelines, with 4,800 km of river barge transport, and with rail and truck used primarily for interstate or local delivery.

Kaneb Pipe Line Partners L.P. operated the Gulf Central ammonia pipeline. The 3,070-km pipeline originates in the Louisiana Delta area where it has access to three marine terminals. It moves north through Louisiana and Arkansas into Missouri, where at Hermann, MO, one branch splits going east into Illinois and Indiana, and the other branch continues north into Iowa and then turns west into Nebraska. The capacity of this pipeline was about 2 Mt/yr, with a storage capacity of more than 1 Mt. CF Industries and Cargill Fertilizer Inc. jointly operated the 135-km-long Tampa Bay Pipeline (TBP) system. The TBP moved nitrogen compounds and ammonium phosphate for fertilizer producers in Hillsborough and Polk Counties, FL. The pipelines of Williams Companies Inc. and its subsidiary Mid-America Pipeline Co. extend from Borger in northern Texas to Mankato in southern Minnesota, covering 1,700 km. The pipelines have a capacity of more than 1 Mt/yr and about 500,000 t of ammonia storage capacity.

In November, Koch Industries Inc. sold its ammonia pipeline to Kaneb Pipe Line for $140 million; however, Koch Industries will continue to own the import terminal at Taft, LA, and 15 terminals along the length of the system. The sale included a 1,360-metric-ton (t) underground storage and terminal facility in Missouri. The ammonia pipeline connects with 3 third-party-owned deepwater import terminals, 11 third-party-owned production and fertilizer upgrading facilities, and 23 third-party-owned delivery terminals, and it connects to another fertilizer pipeline in the Midwest (Fertilizer Week America News Update, 2002). Ammonia primarily is supplied to the pipeline from plants in Louisiana and from foreign-source product through the marine terminals.

Capacities for trucks and railcars are usually 20 t and 100 t, respectively. Depending on the product loaded and the volume of the container, barges can accommodate from 400 t to 2,000 t.

Ammonium nitrate is transported by rail, road, and water, but its transportation on U.S. navigable waterways is restricted. Urea is shipped either in bulk or as bagged material.

Prices

Midyear and yearend prices for nitrogen materials are listed in table 7. Although the swings were not as drastic as those in 2001, U.S. Gulf Coast ammonia and natural gas prices generally followed the same trend in 2002 (figure 1). At the beginning of 2002, the average U.S. Gulf Coast ammonia price was $119 per short ton ($131 per metric ton). This price rose slightly to $140 per short ton ($154 per metric ton) by mid-May, fell back to the level of the beginning of the year, and then rose during the last quarter of 2002, to $173 per short ton ($191 per metric ton), mirroring the rise in natural gas prices. The yearend price was its high for the year; the low price for the year was $115 per short ton ($127 per metric ton), reached in mid-March.

Urea prices followed a similar pattern to those of ammonia (figure 3). At the beginning of 2002, the average granular urea price was $104 per short ton ($115 per metric ton). This price fell until it reached a low of $97.50 per short ton ($107 per metric ton) by the end of March. The average price continued to increase steadily throughout the rest of 2002, ending at $130 per short ton ($143 per metric ton), its highest price of the year. One factor that may have affected short-term urea prices near midyear was fire ant infestations of imported material. Several shipments from South America were quarantined because the urea was infested with fire ants, and there was no effective treatment to kill them, according to the USDA. The urea could be sold only in States that were already completely infested with fire ants (Green Markets, 2002j). Average ammonium nitrate prices were fairly steady in 2002, ranging between $123 per short ton and $135 per short ton ($136 per metric ton and $149 per metric ton) (figure 4).

Ammonium sulfate, however, did not follow the same trends as other nitrogen compounds. This is because much of the ammonium sulfate in the United States is produced as a byproduct of coke ovens, where sulfuric acid is used to remove ammonia generated from the coal, and does not respond as directly to the changes in natural gas pricing. Average ammonium sulfate prices rose slightly during the first half of 2002 to $135 per short ton ($149 per metric ton) from $127 per short ton ($140 per metric ton), then fell at midyear, and increased slightly to reach $125 per short ton by yearend ($138 per metric ton), about the same level it was at the beginning of 2002 (figure 5).

Foreign Trade

Ammonia exports fell by 32% from those in 2001 (table 8). The Republic of Korea, which remained the principal destination, accounted for 88% of total U.S. exports of ammonia. Most of the material shipped to the Republic of Korea was produced at the Agrium plant in Alaska.

Ammonia imports increased by 3% from those in 2001. Trinidad and Tobago (52%) continued to be the largest import source. Canada (19%) and Ukraine (11%) were the remaining significant import sources.

Tables 10 and 11 list trade of other nitrogen materials and include information on principal source or destination countries. Most of the exports of nitrogen materials increased in 2002, with the exception of ammonia, MAP, and mixed chemical fertilizers. Imports of nitrogen materials were lower than those in 2001. Urea and nitrogen solutions imports fell significantly. Urea imports were down by 20%, mostly because of a fall in imports from the Middle East and Asia. Nitrogen solutions imports were down by 50%, mainly as a result of lower imports from Belarus, Russia, and Ukraine—all countries that have the potential to be affected by antidumping duties.

In spite of announcing China's agreed-upon WTO tariff-rate quotas (TRQs) for fertilizers in January, there was still disagreement between China and the United States about the management of these TRQs. In January, in order to comply with its WTO obligations, China's State Economic and Trade Commission (SETC) announced import quotas with a fixed 4% tariff for 1.3 Mt of urea, 5.67 Mt of DAP, and 2.84 Mt of nitrogen-phosphorous-potassium (NPK) fertilizers; these TRQs, however, were not allocated to importing firms until April. TFI claimed that China was manipulating the TRQ process by changing its trade and technical standards, imposing a 13% value-added tax on imports of DAP and issuing other restrictions on trade. According to TFI, the delay in allocating TRQs coincided with the spring application season, which protected the Chinese industry. In addition, China also allocated 3.54 Mt of its DAP TRQ instead of the entire quantity by "parking" the unallocated quota with the large state-trading enterprises and instructing them not to use it. The SETC gave itself the authority to use unqualified discretion in allocating TRQs, which is not found in the WTO agreement. China also is allowing only the same two trading companies that were free to trade in fertilizers before the WTO agreement to have these same rights after the agreement. TFI also claimed that China's value-added tax on DAP discriminated against DAP compared with other phosphate-containing materials, most of which are produced from Chinese sources. In addition, China planned to impose new standards on the heavy-metals content of fertilizer imports. These standards are significantly tighter than those in Europe, the United States, and other places in the world, and this would effectively bar imports of DAP from most countries into China (Fertilizer Week America, 2002b).

China's position was that fertilizer consumption in China was not unlimited and that actual imports should depend on market demand. A notice from the SETC stated that holders of TRQs for 2002 must return any portion that they cannot use by yearend to the SETC by September 15, and the SETC would arrange reallocation by October 15. The SETC's notice also said that TRQ holders will see the quantity that they are allocated in 2003 reduced by any portion that is returned to the SETC. No response to TFI's claims about the 13% value-added tax was provided by the SETC (Fertilizer Week America, 2002c).

World Review

Anhydrous ammonia and other nitrogen materials were produced in more than 80 countries. Global ammonia production in 2002 increased by about 3% from that of 2001 (table 12); China and the United States showed the largest increases in production. In 2002, total ammonia production was 109 Mt of contained nitrogen, according to data reported to the USGS. China, with 28% of this total, was the largest world producer of ammonia. Asia contributed 46% of total world ammonia production, and North America represented 14% of the global total. Countries from the former Soviet Union produced 13% of the total; Western Europe contributed 9%; the Middle East, 7%; Latin America, 5%; and Africa, Eastern Europe, and Oceania, the remaining 6%.

In 2002, world ammonia exports of 13.1 Mt of contained nitrogen were about 4% higher than those in 2001. Trinidad and Tobago (22%), Russia (18%), Ukraine (10%), Indonesia (7%), and Canada (5%) accounted for 62% of the world total. The United States imported 35% of global ammonia trade, followed by Western Europe (23%) and Asia (22%) (International Fertilizer Industry Association, 2003a).

In 2002, world urea production increased by about 6% to 51.4 Mt of contained nitrogen. Urea exports also increased by about 4% to 12.0 Mt of contained nitrogen. China and India, the two largest producing countries, accounted for 48% of world production; production in China increased by about 10%, and production in India decreased by 2% compared with those of 2001. The United States and Canada produced about 10% of the total. Countries from the former Soviet Union exported the largest quantity of urea with 31% of the total. The Middle East accounted for 22% of total exports; Asia and North America, for 11% each; Latin America and Africa, for 7% each; Western Europe, for 6%; and Eastern Europe, for 5%. Asia accounted for 29% of global urea imports, North America for 21%, Latin America for 17%, and Western Europe for 14% (International Fertilizer Industry Association, 2003b). The above percentages for trade in ammonia and urea reflect material that is shipped intraregion as well as material that is shipped among regions; for example, material shipped from Canada to the United States is included in the North American trade shipments.

European Union.—After an investigation begun in October 2000 at the request of the European Fertilizer Manufacturers Association, the European Commission (EC) established final antidumping duties on imports of urea from Belarus, Bulgaria, Croatia, Estonia, Libya, Lithuania, Romania, and Ukraine. In general, the final duties were higher than the preliminary ones that were projected in 2001. Antidumping duties were established as follows: Belarus, 7.81 euros (€) per metric ton; Bulgaria, €21.43 per ton; Croatia, €9.01 per ton; Estonia, €11.45 per ton; Libya, €11.55 per ton; Lithuania, €10.05 per ton; Romania, €6.18 per ton to €8.01 per ton, depending on the producer; and Ukraine €8.85 per ton to €16.84 per ton, depending on the producer (Fertilizer Week, 2002k).

In October, the EU removed the antidumping duty of €19 per ton on imports of UAN from Polish producer Zaklady Azotowe Pulawy S.A. A duty of €22 per ton remains on all other imports of UAN from Poland (Fertilizer Week, 2002m). In April, the EU increased its antidumping duty on Russian ammonium nitrate to €47.07 per ton from €26.30 per ton because it claimed that Russian producers were benefiting from state-fixed natural gas prices that were as much as five times lower than the market rate (Fertilizer Week, 2002l).

The EU granted market economy status to Russia on November 7. Similar to the U.S. recognition of Russia as a market economy, Russia will be treated on an equal basis with all other market-economy countries in antidumping investigations within the EU. The new status took effect for all cases beginning after November 8, regardless of the period of investigation (Green Markets, 2002d).

After the explosion at an ammonium nitrate plant in France in 2001, the EU tightened its regulations on ammonium nitrate. Storage thresholds have been lowered and safety regulations for companies that store above 50 t have been increased. In addition, the EU planned to request mandatory detonation testing of ammonium nitrate for fertilizer producers and importers. The testing requirement was in response to claims that importers of low-priced ammonium nitrate, mostly from Eastern Europe, were obtaining certificates from EU-produced material, then attaching these certificates to the imported products (Chemical Market Reporter, 2002; Fertilizer Week, 2002n).

Argentina.—The Profertil S.A. nitrogen facility was shut down on October 17 because of mechanical problems in both the ammonia and urea plants. Following repairs, the ammonia plant resumed production on November 14, and the urea plant, on November 16 with both running above design rates. The repairs to the urea plant were considered temporary until the new urea heat exchanger with upgraded materials can be installed early in 2004. As a precaution, a backup unit from Agrium's Fort Saskatchewan facility will be delivered to Argentina in April 2003. Profertil S.A. is 50% owned by Agrium and 50% owned by Repsol YPF S.A. (Agrium Inc., 2003§).

Australia.—India's Oswal Projects Ltd. received environmental approval from the Australian Government to construct its proposed 759,000-t/yr ammonia plant in Western Australia. This approval allows the company to obtain funding for the project, which is estimated to cost about $365 million. Construction was scheduled to begin in September, with project completion scheduled for mid-2004 (Fertilizer Week, 2002ac).

Plenty River Corp., which had been searching for additional partners for an ammonia-urea complex in the Burrup Peninsula, selected Agrium in May. (Plenty River dissolved its memorandum of understanding with its Indian partner Chambal Fertilizers and Chemicals Ltd. in 2000.) The consortium, which includes German companies Theiss Pty. Ltd. and Uhde GmbH, will be called Dampier Nitrogen, and the proposed complex would have a capacity of 2,300 metric tons per day (t/d) of ammonia and 3,500 t/d of granular urea. Financing for the $5.6 million project was expected to be completed by April 2003, and plant completion would be scheduled for 2005 or 2006 (Fertilizer Week, 2002a). The local government granted environmental approval for the plant in December.

Australian fertilizer producers Incitec Ltd. and Pivot Ltd. announced that they would merge to form a new company Incitec Pivot Ltd. Explosives producer Orica Ltd., which owns 76.55% of Incitec, would have a controlling share in the new company. As part of receiving Government approval for the merger, Incitec would divest its industrial chemicals division, mainly involved with explosives production, to Orica for $175 million. Incitec operated ammonia plants in Brisbane and Newcastle, a urea plant in Brisbane, and ammonium nitrate plant in Newcastle. Pivot produces mixed fertilizers (Nitrogen & Methanol, 2002a).

Bangladesh.—Bangladesh Chemical Industries Corp. announced in February that it planned to construct an ammonia-urea complex in Sylhet with a capacity of 330,000 t/yr of granular urea, but after extending the initial tender for construction bids until July 31, it had received no bids. The company then requested that the Government finance the project from its Annual Development Programme funds. After that proposal was rejected, the company announced in November that it again would try to attract bids for the project, with bidding scheduled to be completed by February 2003 (News from Bangaldesh, 2002§).

Brazil.—After completing an antidumping investigation that began in 2001, Brazil imposed a 32.1% antidumping duty on imports of ammonium nitrate from Russia and 19% on imports from Ukraine. The duties took effect on November 21 and were to be in effect for 5 years. Estonia was originally included in the investigation, but because that country had no ammonium nitrate production, no duty was established (Fertilizer Week, 2002e).

In July, Cia. Química Metacril increased production capacity at its ammonium sulfate plant in Candeias, Bahia, to 200,000 t/yr from 80,000 t/yr. The total cost of the increase was estimated to be $35 million. Brazil is heavily dependent on imports of ammonium sulfate; domestic production in 2001 met only about 12% of the country's total requirements (Fertilizer Week, 2002f).

Bulgaria.—The Bulgarian Government proposed antidumping duties of up to 40% on imports of ammonium nitrate from Romania, Russia, and Ukraine. The country already had imposed an antidumping duty of 25% on ammonium nitrate from Romania and Ukraine in 2001. High natural gas prices and outdated equipment in the country's plants have led to high production costs for ammonia and urea, which does not allow the four producers—Agrobiochim AD, Agropolychim JSC, Chimco AD, and Neochim plc—to compete with imported products (Fertilizer Week, 2002g).

Agropolychim reportedly submitted a bid for Agrobiochim in July in an effort to increase its market share in the Balkan region. The company was awaiting a court decision to determine if its bid was successful. In addition, Agropolychim was soliciting bids for construction of an $8 million ammonia terminal at Varna, which it expected to complete in 2003. The new terminal would allow Agropolychim to import ammonia from Russia and Ukraine as feedstock for ammonium nitrate production and enable the closure of the company's high-cost ammonia production facility in Devyna (Fertilizer Week, 2002b).

In October, Bulgaria's national electric company cut off the electricity to Chimco's plant because of the company's huge debt. According to press reports, Chimco owed $17.8 million to the electric company. In addition, Chimco's majority stakeholders issued an ultimatum that the company must resume urea production by yearend, or they would sell their shares in the company, and Chimco would be bankrupt (Fertilizer Week, 2002d). The stakeholders' ownership of the majority of the company is in doubt because a U.S. court found that transfer of the shares from the original owner that purchased them in 1999 to the current owners was illegal.

Canada.—Agrium's Fort Saskatchewan, Alberta, urea unit resumed production in October, because of an anticipated increase in customer demand for spring 2003. The urea unit had been idle since June 2001 (Green Markets, 2002b).

Chile.—Potash Corp. of Saskatchewan (PCS) increased its shares in Sociedad Quimica y Minera de Chile S.A. (SQM) to the maximum allowed of 37.5%. In addition to PCS, Sociedad de Inversiones Pampa Calichera S.A. owns 37.5%, and Israel Chemicals Ltd. owns 13.4%. SQM operates a 160,000-t/yr potassium nitrate plant in the Atacama Desert (Industrial Minerals, 2002).

Atacama Minerals Corp. completed construction of evaporation ponds at its Aguas Blancas operation that it will use to produce sodium sulfate and sodium and potassium nitrates. Full production at Aguas Blancas (1,500 t/yr of iodine, 300,000 t/yr of sodium sulfate, and 100,000 t/yr of nitrates) will require completion of a mechanical leaching facility to maximize recoveries from the salt-rich ore at Aguas Blancas. Construction of a pilot plant began in 2002, and it is expected to be operational by the third quarter of 2003. Design and development of a full-scale commercial plant by September 2004 would follow successful testing and operation of the pilot facility (Atacama Minerals Corp., 2003§).

China.—Sichuan Chemical Works (Group) Ltd. began an expansion at its Chengdu urea plant that would increase capacity to 800,000 t/yr from 480,000 t/yr. This expansion was expected to be completed by October 2003. In addition, work on China National Offshore Oil Co.'s 450,000-t/yr ammonia plant at Dongfang, Hainan Island, also began. The ammonia would feed an 800,000-t/yr urea plant that was scheduled to be finished in 2003 (Asia Fertilizer & Agronomic Bulletin, 2002a).

Kellogg Brown & Root (a unit of Halliburton Co.) was awarded a contract to expand Sichuan Lutianhua Co.'s ammonia plant, which would increase the plant's capacity to 450,000 t/yr from 150,000 t/yr. Sichuan Lutianhua also completed an expansion of its urea plant to increase capacity by 140,000 t/yr to 660,000 t/yr; the plant will be able to produce prilled and granular urea. The company chose to expand the two existing plants rather than construct new plants, as was originally planned (Fertilizer Week, 2002ah).

A new west-to-east gas pipeline was being constructed that will connect the natural gas-rich area of western China to the cities on the eastern coast by 2010. Because of this, Ningxia Fengyou Chemical Co. announced plans to build a 700,000-t/yr ammonia-urea complex in Yinchuan, Ningxia. The new pipeline is scheduled to reach Ningxia by 2003 or 2004, and a tentative date of 2004 is scheduled for completion of the proposed plant. The company, however, was still looking for a foreign partner to take a 50% stake in the project (Nitrogen & Methanol, 2002b).

DSM N.V. of the Netherlands and China's Sinopec Corp. formed a joint venture, DSM Nanjing Chemical Co., to expand production at the Nanjing caprolactam plant, which produces ammonium sulfate as a byproduct. Ammonium sulfate production capacity at the plant was about 110,000 t/yr; this will be increased to about 250,000 t/yr after caprolactam production is increased in 2004 (Fertilizer Week, 2002h).

Colombia.—In February, the Colombian Government banned imports and production of agricultural-grade ammonium nitrate and restricted imports of calcium ammonium nitrate in an effort to stop guerrilla groups from using these materials to make explosives. Imports of calcium ammonium nitrate were not banned entirely because of the difficulty in making explosives out of that material. Ironically, the ban on ammonium nitrate imports does not cover imports of low-density ammonium nitrate, which is imported by the Government to make explosives for use by the country's coal mining industry; approximately 100,000 t/yr of low-density ammonium nitrate is imported by Colombia (Fertilizer Markets, 2002a).

Estonia.—In November, Nitrofert JSC, the country's only fertilizer producer, suspended production indefinitely at its ammonia-urea complex in Kohtla-Järve after the country's gas producer Mezregiongaz pulled out of a long-term natural gas supply contract. The plant, which has the capacity to produce 200,000 t/yr of ammonia and 180,000 t/yr of prilled urea, has been closed since April when it was shut for maintenance. It is likely that the company was unable to pay higher winter gas rates, and the antidumping duty established in the EU on urea imports from Estonia, which was Nitrofert's principal market, limited the company's ability to sell its product (Fertilizer Week, 2002z).

France.—TotalFinaElf Group, the 80% owner of Grand Paroisse S.A., which was the plant operator, decided to not to rebuild its Toulouse ammonium nitrate plant where there was an explosion in September 2001. The French police arrested the director of the operation and several employees for involuntary manslaughter for their alleged involvement in the explosion (Fertilizer Markets, 2002b). Grand Paroisse also announced that it would close its 140,000-t/yr ammonia plant in Waziers because the plant was no longer competitive. The closure was expected to take place by yearend (Fertilizer Week, 2002p).

Georgia.—The Russian private gas firm ITERA Holding Ltd. purchased a 90% share of the country's only fertilizer producer RustaviAzot for $500,000. This deal was part of a writeoff of RustaviAzot's debt to ITERA, which was estimated to be $100 million. ITERA planned to invest $14 million to modernize the plant and increase operating capacity to its original capacity of 326,000 t/yr of ammonia, 450,000 t/yr of ammonium nitrate, and 140,000 t/yr of ammonium sulfate. The plants have been operating at significantly less than these capacities for several years (Fertilizer Week, 2002u).

India.—Coromandel Fertilisers Ltd. wrote off its 120,000-t/yr ammonia plant at Visakpatnam that had been closed for 2 years because of high feedstock prices. The company planned to sell the plant for spare parts (Fertilizer Week, 2002ai). Deepak Fertilisers and Petrochemicals Corp. Ltd. announced that it was constructing a 100,000-t/yr ammonium nitrate plant at Taloja that was expected to be completed by yearend 2002. The company already produced ammonia, methanol, and nitric acid at the site (Asia Fertilizer & Agronomic Bulletin, 2002c). Hindustan Fertiliser Corp. restarted urea production at the end of March after completing the first phase of its revamp project at its 315,000-t/yr Namrup III plant. The company also planned to complete additional work on its Namrup I and II plants by October to increase total urea production capacity at the site to 550,000 t/yr (Fertilizer Week, 2002q).

India's Group of Ministers, which was appointed by the Government, submitted its recommendations for replacing the country's retention pricing scheme (RPS) for urea. [The RPS allowed an automatic 12% after-tax return on capital investment as soon as new units were commissioned.] Under the recommendations, urea plants would be divided into six groups depending on their age and feedstock. Any urea plant whose existing retention price is lower than the group's average would receive a subsidy based on its existing retention price. If a plant's retention price is higher than the group's average, it will receive a subsidy based on the group's average. The group also recommended that urea producers be allowed to sell 50% of their production to their choice of markets within India at a price fixed by the Government and that the transportation subsidy to urea producers be reduced by 50% in 2003 and removed entirely beginning in April 2004. Existing regulations required the producers to distribute their product according to Government directives, and urea transportation was fully subsidized (Fertilizer Week, 2002s). The Government approved this policy at the beginning of 2003.

Eleven Indian urea producers formed a consortium to import naphtha through the Fertiliser Association of India. Because the Government discontinued the fixed price format for naphtha purchases in April, the consortium hoped that by purchasing naphtha as a group, they could get the feedstock at a competitive price (Fertilizer Week, 2002t).

As part of its privatization plan, the Indian Government announced that it would sell 51% of its total 97.38% ownership of Fertilisers & Chemicals Travancore Ltd. This the third company of which the Government wanted to sell a significant portion of its ownership—the others were National Fertiliser Ltd. and Madras Fertiliser Ltd. (Fertilizer Week, 2002aj).

India's Commerce Ministry began an investigation on dumping of ammonium nitrate from Russia and Iran. Four domestic companies filed a petition for investigation in September (Green Markets, 2002k).

Indonesia.—PT Pupuk Kalimantan Timur Tbk. completed its Kaltim IV 570,000-t/yr urea plant in May and planned to complete the associated 330,000-t/yr ammonia plant by May 2003. Until the ammonia plant is complete, the new urea plant will be fed from surplus ammonia produced at the same location. The company was considering replacing the Kaltim I plant with a new facility and scheduled a feasibility study for 2006 (Asia Fertilizer & Agronomic Bulletin, 2002b).

Iran.—National Petrochemical Co. awarded a contract to a local firm, Petrochemical Industries Design & Engineering Co., to construct a 675,000-t/yr ammonia plant in Razi; in 2001, the company awarded a contract for a new urea plant at the same location. National Petrochemical already operated two 330,000-t/yr ammonia plants in Razi. No timetable was established for the new plant construction (Fertilizer Week, 2002aa).

Kermanshah Petrochemicals Industries Co. awarded a $263 million bid to a consortium of firms to build an ammonia-urea complex in the western province of Kermanshah. The consortium consists of Kawasaki Heavy Industries Ltd. and Tomen Corp. of Japan and Namvaran Consulting Engineers & Managers of Iran. The new plant, which will use M.W. Kellogg Ltd.'s ammonia technology and Stamicarbon bv's urea technology, will have capacities of 396,000 t/yr of ammonia and 660,000 t/yr of granular urea. Startup was scheduled for the end of 2005 (Fertilizer Week, 2002v).

Ireland.—In October, Irish Fertilizer Industries Ltd. announced that it was closing all three of its fertilizer plants at Marino Point, Arklow, and Belfast. Weak ammonia prices and high feedstock costs were cited as the principal reasons for the closures. The Marino Point plant had the capacity to produce 530,000 t/yr of ammonia and 400,000 t/yr of urea. Most of the ammonia that was not used for urea was sent to the company's Arklow plant as feed material for calcium ammonium nitrate production or to its Belfast plant for NPK fertilizer production (Fertilizer Week, 2002r).

Italy.—EniChem S.p.A. planned to permanently close its caprolactam and byproduct ammonium sulfate plant in Porto Marghera by yearend. The plant had the capacity to produce 350,000 t/yr of ammonium sulfate (Fertilizer Week, 2002j).

Korea, Republic of.—In February Namhae Chemical Corp. indefinitely shut both of its ammonia plants at Youchun because of the high cost of naphtha feedstock. Total capacity at the plants was 660,000 t/yr. Namhae used most of the ammonia internally to produce NPK fertilizers, ammonium nitrate, and other chemicals (Fertilizer Markets, 2002c).

Kuwait.—In August, Petrochemical Industries Co. completed the conversion of its Shuaiba II and III urea units to granular urea production from prilled urea, and increased the plants' combined capacity by about 15% to 1,750 t/d. In addition, the company awarded a contract to Technimont S.p.A. to convert two additional urea units at the site from prilled to granular urea; the plants' total capacity is 578,000 t/yr. The conversion was scheduled to be completed by March 2003 (Fertilizer Week, 2002ad).

Mexico.—Mexico's urea industry remained idle in 2002; the industry has been idle since 1999.

Nigeria.—The Government planned to sell a 51% share of National Fertilizer Co. of Nigeria by the beginning of 2003. Six companies have been prequalified to purchase the share, and the remaining 49% will be sold on the stock market (Fertilizer Week, 2002x).

Oman.—In April, Oman-India Fertilizer Co. signed a $770 million contract with France's Technip-Coflexip S.A. and Italy's Snamprogetti S.p.A. to design and construct an ammonia-urea complex at Sur. The complex would consist of two 1,750-t/d ammonia units and two 2,350-t/d urea units. By June, the company had financing for the project from a consortium of banks combined with the equity that the three partners in the joint venture—Oman Oil Co., Indian Farmers Fertiliser Cooperative Ltd., and Krishak Bharati Cooperative Ltd.—are providing. Startup was scheduled for 35 months after construction began (Fertilizer Week, 2002ab).

Sohar International Urea & Chemical Industries awarded a $500 million construction contract to Uhde of Germany for the construction of an ammonia-urea complex at Sohar with capacities of 2,000 t/d of ammonia and 3,500 t/d of urea. Work was scheduled to begin in the first half of 2003, and was expected to be completed within 35 months (Fertilizer Week, 2002af).

Engro Chemical Pakistan Ltd. and Oman Oil signed a memorandum of understanding to construct an ammonia-urea complex at Sohar. The project would involve the construction of a new 850,000-t/yr urea unit and purchasing and refurbishing of an existing ammonia unit—perhaps Kemira Agro's mothballed ammonia plant at Rozenburg, Netherlands, which had closed in 2000. The joint venture planned to complete a feasibility study by mid-2003, and plant completion was targeted for the fourth quarter of 2005 (Fertilizer Week, 2002i).

Pakistan.—Fauji Fertiliser Co. acquired 90% of Government-owned Pak-Saudi Fertilizer Ltd. at the end of May. The company planned to invest about $15.3 million during the next several years to modernize the plant. The country's Privatisation Commission planned to solicit bids for Pak-Arab Fertilizers (Pvt.) Ltd.; a final award was expected in 2003. Both of these companies produced urea and calcium ammonium nitrate (Fertilizer Week, 2002aj).

Romania.—At yearend, the Government was negotiating with two firms that had submitted bids for its 79.05% share in S.C. Nitramonia S.A. in August. Nitramonia produced ammonia, ammonium nitrate, explosives, and other nitrogen-based chemicals (Fertilizer Week, 2002y).

Russia.—In June, MDM Bank Group acquired an 80% stake in the country's second-largest nitrogen fertilizer manufacturer NovomsksvskAzot. (In 2001, the company acquired a controlling ownership in NevinnomysskAzot.) Both operations produced ammonia, urea, and ammonium nitrate. MDM planned to invest additional capital into the NovomsksvskAzot plant to modernize the facilities, some of which date back to the 1970s, and issued its first bond in December to raise funds (Fertilizer Week, 2002o).

Saudi Arabia.—Saudi Arabia Basic Industries Co. (Sabic) announced that it would construct Sabic IV, a new ammonia-urea complex at its existing plant in Jubail. The total capacities at the complex would be 3,300 t/d of ammonia and 3,300 t/d to 3,500 t/d of urea. As a result, there would be 400,000 t/yr to 430,000 t/yr of surplus ammonia available for export, which would bring the company's total ammonia export potential to more than 1 Mt/yr. The complex was expected to be completed by 2004 (Fertilizer Week, 2002ae).

Serbia and Montenegro.—In September, the Government announced that it would extend a $10.5 million loan to Azotara, the country's sole nitrogen producer, that would allow the company to restart its ammonia, urea, and calcium ammonium nitrate operations at Pancevo. The plants had been closed since June because of high fertilizer inventories and high gas costs. Azotara was also looking for foreign investors for funds to rebuild its NPK fertilizer unit, which was destroyed by North Atlantic Treaty Organization bombings in 1999 (Fertilizer Week, 2002c).

Trinidad and Tobago.—CL Financial Ltd. obtained financing in March for its second ammonia plant in Point Lisas. The $318 million financing agreement for the 640,000-t/yr plant, Nitrogen 2000, included some of the same partners that CL Financial had in its first plant—Kellogg Brown & Root was providing technology for both plants, the German Development Bank has financed both plants, and EOG Resources Inc. was providing natural gas for both plants as well. The plant was expected to be completed by 2005 (Fertilizer Markets, 2002d). Later in the year, Koch Nitrogen invested in the new plant and announced that it would market the plant's production on a long-term basis (Fertilizer Week America MidWeek Report, 2002). Commercial operations for CL Financial's first ammonia plant, Caribbean Nitrogen Co. Ltd.'s 1,850-t/d plant, began in July. The plant took 24 months to build and was completed at a cost of $315 million (Green Markets, 2002c).

Turkey.—The Turkish Privatization Agency delayed privatization of fertilizer producers Istanbul Gübre Sanayii (Igsas) and Türkiye Gübre Sanayii (Tügsas) because of upheaval in the country. Earlier in the year, the agency merged Igsas into Tügsas in an effort to cut costs on shared procurement of feedstocks such as natural gas. The Privatization Agency planned to offer to sell the components of Tügsas—Gemlik Fertilizer, Samsun Fertilizer, and Kütahya Fertilizer—individually in June 2003 (Republic of Turkey Prime Ministry Privatization Administration, undated§).

Turkmenistan.—In March, Germany's Uhde began construction of a $240 million nitrogen complex in Tedzhen. Turkish firm GAP Insaatyatirim Ve Dis Ticaret AS will supply the equipment and supervise the plant's commissioning. The proposed plant would have the capacity to produce 200,000 t/yr of ammonia, 350,000 t/yr of granulated urea, and 150,000 t/yr of ammonium nitrate. Construction was expected to be completed by late 2004. This new operation, along with an expansion of the urea plant at Mary, was part of the Government's effort to become more self-sufficient in urea and reduce dependence on imports from Russia and Ukraine (Fertilizer Week, 2002w).

Ukraine.—The Government continued to try to sell its 25.17% ownership of nitrogen fertilizer producer DneproAzot in April, July, and September of 2002; the shares were originally offered in November 2001. No bids were received in the offering periods. One reason that the shares received no bid was because the tender requires the buyer to participate in a revamp of the company's production facilities, and the equipment is fairly old, some of it dating back to 1979. DneproAzot has the capacity to produce 900,000 t/yr of ammonia and 660,000 t/yr of urea (Fertilizer Week, 2002ak).

Uzbekistan.—The U.S. Trade and Development Agency offered a $635,000 grant to a U.S. firm for a feasibility study to build a new nitrogen complex to replace one managed by Uzkimyosanoat at Navoi. Uzkimyosanoat, which was established in 2001, is the successor of the Chemical Industry Association of Uzbekistan, a Ministry-level organization that was responsible for all chemical and fertilizer manufacturing. Uzkimyosanoat is structured as a holding company for a number of chemical enterprises. The Navoi fertilizer complex project would consist of a new 300,000-t/yr ammonia plant, a 360,000-t/yr nitric acid plant, and a 450,000-t/yr ammonium nitrate plant to replace existing plants. The facilities at Navoi were well beyond their useful life and in very poor condition. Spare parts often were unavailable because of the age of the units, and the overall conversion efficiency was low because of the technology utilized (Fertilizer Week, 2002ag).

Venezuela.—A national strike on December 2 shut down almost all the country's petroleum and downstream chemical processing operations. Because most of the natural gas used as feedstock for ammonia production is associated with oil production, there was no raw material to feed to the fertilizer operations (Nitrogen & Methanol, 2003).

Current Research and Technology

Scientists at Northwestern University demonstrated a patented low-cost electron biofilm reactor that converts nitrates from fertilizer into nitrogen gas. Results from testing have shown that 0.3 gallon per minute of water can be treated with the reactor at an estimated cost of less than 50 cents per thousand gallons. The reactor has been demonstrated to remove perchlorates in addition to nitrates. Natural microorganisms that live on the surface on the reactor's membranes act as catalysts for the transfer of electrons from hydrogen to the oxidized contaminants in the water, and convert them to harmless materials (Green Markets, 2002g).

ArcTech Inc. demonstrated a method to convert obsolete explosives and propellants into fertilizer. The company uses humic acid, recovered as a byproduct during biological fermentation of coal, to decompose the hazardous materials. In a hydrolysis reaction with a proprietary reagent, the chemicals are broken up, releasing nitrogen, which bonds to the humic acid molecule. Phosphoric acid is added as a neutralizer to produce a fertilizer that contains phosphorous and potash in addition to nitrogen (Green Markets, 2002h).

Wahlco Inc. announced that it received a $1 million contract to provide its patented U2A™ (urea-to-ammonia conversion) system to be used in NOx reduction applications at a major Maryland installation. The system is designed to produce 100 pounds per hour of ammonia from a 50% urea solution for year-round operation and will serve three gas-fired turbines at a liquid natural gas compressor station near Baltimore, MD. Ammonia is used in reducing the emission of NOx into the atmosphere. The U2A™ system converts urea into ammonia at the plant site, as needed, thereby eliminating ammonia transportation and storage risks (Wahlco Inc., 2002§).

Outlook

According to the USDA's National Agricultural Statistical Service (2003§), farmers' planting intentions for the 2003 crop year were estimated to be 101.4 million hectares for the eight major field crops, which was essentially that same as the area planted in 2002. Corn growers intended to plant 32.0 million hectares of corn, virtually unchanged from that in 2002. Soybean growers intended to plant an estimated 29.6 million hectares of soybeans, about 1% lower than that in 2002; this would be the lowest planted area since 1998. This is the third consecutive year that soybean acreage has declined in the United States. With corn plantings expected to remain at the same level, nitrogen consumption for fertilizer in 2003 should also remain at about the same level as that in 2002.

According to long-term projections by the USDA's Economic Research Service (2003§), aggregate U.S. crop area increased sharply in crop year 2002-3, primarily because of rising corn and wheat plantings as farmers responded to reduced supplies and higher prices in 2002. As production rebounds and prices decline, planted acreage would fall through 2005. For the remainder of the projections, acreage increased as producers responded to generally rising net returns as demand and prices strengthen. Corn and wheat acreage each rose in 2003, particularly wheat, in response to reduced supplies and high market prices in 2002-3. Plantings would fall back during the following 2 years as supplies rebounded and prices declined. The USDA estimated that under the 2002 Farm Act, marketing loan benefits would largely offset market price movements and, thus, hold corn plantings flat in 2005-7 and wheat acreage flat in 2005-10. Soybean area planted was projected to decline in 2003 because of higher returns for competing crops, particularly corn. Soybean acreage then was expected to increase slightly through the rest of the projection period in response to growing demand and higher prices and net returns. Marketing loan benefits also would support increased soybean acreage in 2004-6.

Fluctuating natural gas prices and financial difficulties at some of the largest U.S. nitrogen producers continue to fuel the trend of ammonia production moving from the United States to areas such as Latin America and the Middle East, where there are large resources of natural gas. Within the past 5 years, total ammonia production capacity in the United States has fallen by 10%, and production has generally trended downward, with imports of ammonia increasing. In addition, the gap between production and production capacity has widened reflecting extended capacity closures. These trends are expected to continue and perhaps worsen, depending mainly on the direction of the U.S. economy and the stability of natural gas prices.

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TABLE 1
SALIENT AMMONIA STATISTICS[1, 2]

(Thousand metric tons of contained nitrogen unless otherwise specified)

	1998	1999	2000	2001	2002
United States:					
Production	13,800	12,900	11,800 r	9,350 r	10,800 p
Exports	614	562	662	647	437
Imports for consumption	3,460	3,890	3,880	4,550	4,670
Consumption, apparent[3]	17,100	16,300	14,900 r	13,500 r	15,200 p
Stocks, December 31, producers'	1,050	996 [4]	1,120 [4]	916 [4]	771 [4]
Average annual price per short ton product, free on board Gulf Coast[5]	121	109	169	183	137
Net import reliance as a percentage of apparent consumption[6]	19	21	21 r	31 r	28 p
Natural gas price, wellhead[7]	2	2	4	4	3 e
World:					
Production	104,000	107,000 r	108,000 r	105,000 r	109,000 e
Trade[8]	11,300	12,000	12,700	12,600	13,100 p

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Data are rounded to no more than three significant digits.
[2]Synthetic anhydrous ammonia, calendar year data, U.S. Census Bureau; excludes coke oven byproduct.
[3]Calculated from production plus imports minus exports and industry stock changes.
[4]Source: The Fertilizer Institute.
[5]Source: Green Markets.
[6]Defined as imports minus exports, adjusted for industry stock changes.
[7]Source: Monthly Energy Review, U.S. Department of Energy. Average annual cost at wellhead in dollars per thousand cubic feet.
[8]Source: International Fertilizer Industry Association Statistics, World Anhydrous Ammonia Trade.

TABLE 2
ANHYDROUS AMMONIA SUPPLY AND DEMAND IN THE UNITED STATES[1]

(Thousand metric tons of contained nitrogen)

	2000	2001	2002[p]
Production:			
Fertilizer:			
January-June	5,760	3,940	4,900
July-December	4,510	4,490	4,830
Total	10,300 r	8,420 r	9,730
Nonfertilizer:			
January-June	741	403	560
July-December	772	526	540
Total	1,510	929 r	1,100
Grand total	11,800 r	9,350 r	10,800
Imports for consumption:			
January-June	1,880	2,550	2,090
July-December	2,010	2,010	2,570
Total	3,880	4,550	4,670
Exports:			
January-June	397	392	242
July-December	265	255	195
Total	662	647	437
Stocks, end of period:[2]			
January-June	831	972	783
July-December	1,120	916	771
Apparent consumption:[3]			
January-June	8,150	6,640	7,450
July-December	6,740	6,820	7,760
Total	14,900	13,500	15,200

[p]Preliminary. [r]Revised.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Source: Green Markets.

[3]Calculated from production plus imports minus exports and industry stock changes.

Source: U.S. Census Bureau.

TABLE 3
MAJOR DOWNSTREAM NITROGEN COMPOUNDS
PRODUCED IN THE UNITED STATES[1, 2]

(Thousand metric tons)

Compound	2001	2002[p]
Urea:		
January-June:		
Gross weight	2,970	3,600
Nitrogen content	1,360	1,650
July-December:		
Gross weight	3,230	3,730
Nitrogen content	1,480	1,710
Total:		
Gross weight	6,200 r	7,330
Nitrogen content	2,850 r	3,360
Ammonium phosphates:[e, 3]		
January-June:		
Gross weight	6,640	7,840
Nitrogen content	1,140	1,250
July-December:		
Gross weight	7,820	7,680
Nitrogen content	1,210	1,220
Total:		
Gross weight	14,500 r	15,500
Nitrogen content	2,340 r	2,470
Ammonium nitrate:		
January-June:		
Gross weight	3,180	3,380
Nitrogen content	1,080	1,150
July-December:		
Gross weight	3,100	3,270
Nitrogen content	1,050	1,110
Total:		
Gross weight	6,280 r	6,660
Nitrogen content	2,130 r	2,260
Nitric acid:		
January-June:		
Gross weight	3,290	3,310
Nitrogen content	724	729
July-December:		
Gross weight	3,120	3,440
Nitrogen content	687	757
Total:		
Gross weight	6,420 r	6,750
Nitrogen content	1,410 r	1,490
Ammonium sulfate:[4]		
January-June:		
Gross weight	1,150	1,230
Nitrogen content	244	260
July-December:		
Gross weight	1,170	1,340
Nitrogen content	248	284
Total:		
Gross weight	2,320	2,570
Nitrogen content	492	544

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Ranked in relative order of importance by nitrogen content.
[3]Diammonium phosphate, monoammonium phosphate, and other ammonium phosphates.
[4]Excludes coke plant ammonium sulfate.

Source: U.S. Census Bureau, Current Industrial Reports MQ325B.

TABLE 4
DOMESTIC PRODUCERS OF ANHYDROUS AMMONIA IN 2002[1]

(Thousand metric tons per year of ammonia)

Company	Location	Capacity[2]
Agrium Inc.	Borger, TX	490
Do.	Finley, WA	180
Do.	Kenai, AK	1,250
Air Products and Chemicals Inc.	Pace Junction, FL	71
CF Industries Inc.	Donaldsonville, LA	2,000
Cherokee Nitrogen Division of LSB Industries Inc.	Cherokee, AL	175
Coastal Chem Inc.[3]	Cheyenne, WY	259
Coastal Refining and Marketing Inc.[3]	Freeport, TX	204
Coastal St. Helens Chemical[3]	St. Helens, OR	101
Dakota Gasification Co.	Beulah, ND	363
Farmland Industries Inc.	Beatrice, NE	272
Do.	Coffeyville, KS	350
Do.	Dodge City, KS	281
Do.	Enid, OK	907
Do.	Fort Dodge, IA	339
Do.	Lawrence, KS[4]	420
Do.	Pollock, LA[4]	470
Green Valley Chemical Corp.	Creston, IA	32
Honeywell International Inc.	Hopewell, VA	409
IMC-Agrico Co.	Donaldsonville (Faustina), LA	508
J.R. Simplot Co.	Pocatello, ID[5]	93
Koch Nitrogen Co.	Sterlington, LA	998
MissChem Nitrogen LLC[6]	Yazoo City, MS	621
Nitromite Fertilizer	Dumas, TX	128
PCS Nitrogen Inc.	Augusta, GA	750
Do.	Geismar, LA	541
Do.	Lima, OH	579
Do.	Woodstock, TN	409
Royster-Clark Inc.	East Dubuque, IL	278
Shoreline Chemical	Gordon, GA	31
Terra Industries Inc.	Beaumont, TX	231
Do.	Blytheville, AR	381
Do.	Port Neal, IA	336
Do.	Verdigris, OK	953
Do.	Woodward, OK	399
Triad Nitrogen LLC[6]	Donaldsonville (Ampro), LA	500
Do.	Donaldsonville (Triad), LA	400
Total		16,700

[1]Data are rounded to no more than three significant digits; may not add to total shown.
[2]Engineering design capacity adjusted for 340 days per year of effective production capability.
[3]Subsidiary of El Paso Corp.
[4]Closed in May 2002.
[5]Closed in August 2002.
[6]Wholly owned subsidiary of Mississippi Chemical Corp.

TABLE 5

U.S. NITROGEN FERTILIZER CONSUMPTION, BY PRODUCT TYPE[1, 2]

(Thousand metric tons of nitrogen)

Fertilizer material[3]	2001	2002[p]
Single-nutrient:		
Anhydrous ammonia	2,740 r	2,880
Nitrogen solutions[4]	2,580 r	2,530
Urea	2,100 r	2,210
Ammonium nitrate	479 r	483
Ammonium sulfate	218 r	200
Aqua ammonia	64	51
Other[5]	306	343
Total	8,480 r	8,690
Multiple-nutrient[6]	2,090 r	2,270
Grand total	10,600 r	11,000

[p]Preliminary. [r]Revised.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Fertilizer years ending June 30.

[3]Ranked in relative order of importance by product type.

[4]Principally urea-ammonium nitrate solutions, 29.9% nitrogen.

[5]Includes other single-nutrient nitrogen materials, all natural organics, and statistical discrepencies.

[6]Various combinations of nitrogen (N), phosphate (P), and potassium (K): N-P-K, N-P, and N-K.

Source: Commercial Fertilizers 2002. Prepared as a cooperative effort by The Fertilizer Institute and the Association of American Plant Food Control Officials.

TABLE 6
U.S. PRODUCER STOCKS OF FIXED NITROGEN
COMPOUNDS AT END OF PERIOD[1]

(Thousand metric tons of nitrogen)

Material[2]	2001	2002[p]
Ammonia:[3]		
January-June	972	783
July-December	916	771
Nitrogen solutions:[4]		
January-June	232	94
July-December	181	96
Urea:		
January-June	90	69
July-December	117	87
Ammonium phosphates:[5]		
January-June	68	43
July-December	49 r	64
Ammonium nitrate:		
January-June	56	54
July-December	41 r	71
Ammonium sulfate:		
January-June	11	30
July-December	31	11
Yearend total[6]	1,340 r	1,100

[p]Preliminary. [r]Revised.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Ranked in relative order of importance.
[3]Source: The Fertilizer Institute.
[4]Urea-ammonium nitrate and ammoniacal solutions.
[5]Diammonium and monoammonium phosphates.
[6]Calendar year ending December 31.

Source: U.S. Census Bureau, Current Industrial Reports MQ325B, except where noted.

TABLE 7
PRICE QUOTATIONS FOR MAJOR NITROGEN COMPOUNDS AT END OF PERIOD

(Dollars per short ton)

Compound	2001 June	2001 December	2002 June	2002 December
Ammonium nitrate, free on board (f.o.b.) Corn Belt[1]	140-160	120-130	125-135	120-130
Ammonium sulfate, f.o.b. Corn Belt[1]	137-145	124-129	130-135	120-130
Anhydrous ammonia:				
F.o.b. Corn Belt	240-290	170-180	181-190	233-245
F.o.b. Gulf Coast[2]	175	125	140	170-175
Diammonium phosphate, f.o.b. central Florida	130-135	133-140	141-143	134-138
Urea:				
F.o.b. Corn Belt, prilled and granular	130-160	130-135	130-140	150-160
F.o.b. Gulf Coast, granular[2]	105-108	104-108	124-125	128-132
F.o.b. Gulf Coast, prilled[2]	95-100	103-105	121	125

[1]Illinois, Indiana, Iowa, Missouri, Nebraska, and Ohio.
[2]Barge, New Orleans.

Source: Green Markets.

TABLE 8
U.S. EXPORTS OF ANHYDROUS AMMONIA, BY COUNTRY[1]

(Thousand metric tons of ammonia)

Country	2001	2002
Canada	47	7
Korea, Republic of	542	468
Mexico	95	3
Philippines	--	23
Taiwan	86	24
Other	17 r	7
Total	787	532

[r]Revised. -- Zero.
[1]Value data suppressed by U.S. Census Bureau.

Source: U.S. Census Bureau.

TABLE 9
U.S. IMPORTS OF ANHYDROUS AMMONIA, BY COUNTRY[1]

(Thousand metric tons of ammonia and thousand dollars)

	2001		2002	
Country	Gross weight	Value[2]	Gross weight	Value[2]
Argentina	28	5,710	31	4,100
Brazil	--	--	81	9,720
Canada	802	171,000	1,070	163,000
Colombia	66	11,000	42	5,270
Indonesia	139	27,100	13	1,560
Italy	(3)	19	--	--
Japan	2	200	1	102
Kuwait	23	3,430	--	--
Latvia	80	17,500	25	3,240
Malaysia	6	1,440	--	--
Mexico	--	--	73	9,240
Norway	20	4,720	--	--
Russia	336	58,500	352	48,000
Saudi Arabia	59	13,000	--	--
Trinidad and Tobago	2,880	455,000	2,950	380,000
Ukraine	858	184,000	621	83,200
Venezuela	242	40,300	419	55,000
Total	5,540	992,000	5,680	763,000

-- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Cost, insurance, and freight value.
[3]Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 10
U.S. EXPORTS OF MAJOR NITROGEN COMPOUNDS[1]

(Thousand metric tons)

	2001		2002		
Compound	Gross weight	Nitrogen content	Gross weight	Nitrogen content	Principal destinations, 2002
Ammonium nitrate[2]	19	6	98	33	Mexico, 41%; Canada, 28%; Germany, 26%.
Ammonium sulfate[2]	668	180	874	236	Brazil, 63%.
Anhydrous ammonia	787	647	532	437	Republic of Korea, 88%.
Diammonium phosphate	6,410	1,150	6,820	1,230	China, 62%.
Monoammonium phosphate	2,580	284	2,210	243	Australia, 25%; Brazil, 24%; Canada, 20%.
Urea	792	364	963	442	Mexico, 32%; Republic of Korea, 24%; Thailand, 16%.
Mixed chemical fertilizers[3]	406	49	285	34	Colombia, 34%; Mexico, 26%, Canada, 12%.
Other nitrogenous fertilizers[4]	157	46	337	100	Canada, 22%; Italy, 18%; Philippines, 11%.
Total	11,800	2,730	12,100	2,750	

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes industrial chemical products.
[3]Harmonized Tariff Schedule of the United States (HTS) codes 3105.10.0000, 3105.20.0000, and 3105.51.0000.
[4]HTS codes 3101.00.0000, 3102.29.0000, 3102.60.0000, and 3102.90.0000.

Source: U.S. Census Bureau.

TABLE 11
U.S. IMPORTS OF MAJOR NITROGEN COMPOUNDS[1]

(Thousand metric tons and thousand dollars)

Compound	2001 Gross weight	2001 Nitrogen content	2001 Value[2]	2002 Gross weight	2002 Nitrogen content	2002 Value[2]	Principal sources, 2002
Ammonium nitrate[3]	953	323	127,000	990	336	115,000	Canada, 47%; Netherlands, 19%; Russia, 13%.
Ammonium nitrate-limestone mixtures	1	(4)	87	1	(4)	141	Japan, 37%; Spain, 23%; Canada, 21%.
Ammonium sulfate[3]	335	71	28,700	347	74	27,400	Canada, 77%.
Anhydrous ammonia[5]	5,540	4,550	992,000	5,680	4,670	763,000	Trinidad and Tobago, 52%; Canada, 19%; Ukraine, 11%.
Calcium nitrate	128 r	22 r	12,900	99	17	9,070	Norway, 99%.
Diammonium phosphate	133	24	22,300	156	28	32,800	Russia, 84%; Canada, 10%.
Monoammonium phosphate	262	29	48,600	229	25	46,700	Russia, 68%; Canada, 21%.
Nitrogen solutions	2,000	597	235,000	997	298	98,400	Russia, 31%; Canada, 27%; Romania, 11%.
Potassium nitrate	51	7	14,900	101	14	31,800	Chile, 75%; Israel, 16%.
Potassium nitrate-sodium nitrate mixtures	15	2	2,920	16	2	4,820	Chile, 97%.
Sodium nitrate	92	15	17,800	77	13	12,600	Chile, 93%.
Urea	4,800	2,200	773,000	3,840	1,760	556,000	Canada, 52%; Trinidad and Tobago, 11%; Saudi Arabia, 10%.
Mixed chemical fertilizers[6]	317	38	73,200	234	28	58,800	Norway, 28%; Canada, 25%; Russia, 22%.
Other nitrogenous fertilizers[7]	194	57	35,700	252	75	40,400	Norway, 82%.
Total	14,800 r	7,940 r	2,380,000	13,000	7,340	1,800,000	

[r]Revised.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Cost, insurance, and freight value.
[3]Includes industrial chemical products.
[4]Less than 1/2 unit.
[5]Includes industrial ammonia.
[6]Harmonized Tariff Schedule of the United States (HTS) codes 3105.10.0000, 3105.20.0000, 3105.51.0000, and 3105.90.0050.
[7]HTS codes 3101.00.0000, 3102.29.0000, 3102.60.0000, and 3102.90.0000.

Source: U.S. Census Bureau.

TABLE 12
AMMONIA: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons of contained nitrogen)

Country	1998	1999	2000	2001	2002
Afghanistan[e]	5	5	20 r	20 r	20
Albania[e]	10	10	10	10	10
Algeria	350	455	458	469	563
Argentina	86	88	199	597	617
Australia	435	431	576	762	686
Austria[e]	450	450	450	440 r	440
Bahrain	336	370	350	372	377
Bangladesh[3]	1,129	1,240	1,255	1,273 r	1,289
Belarus	685	765	730	725	760
Belgium	756	840	863	788	842
Bosnia and Herzegovina[e]	1	1	1	1	1
Brazil	949	1,084	925	769	1,021
Bulgaria	448	315	533	477	328
Burma	52	66	78	28	21
Canada	3,900	4,135	4,130	3,439	3,594
China	25,800	28,300	27,700	28,200 r	30,100 e
Colombia	100	75	93	95	108
Croatia	248	318	325	259	235
Cuba[e]	135	135	135	135	135
Czech Republic	258	223	246	206	215
Denmark[e]	2	2	2	2	2
Egypt	1,141	1,407	1,511	1,801 r	1,839
Estonia	175	164	145	151	39
Finland[e]	6	6	6	6	6
France[e]	1,570	1,580	1,620	1,380 r	1,050
Germany	2,512	2,406	2,599 r	2,522 r	2,560
Georgia	64	104	135	60	90
Greece	178	160	121	57	66
Hungary	288	261	352	324	238
Iceland	6	7 e	7 e	3	--
India[4]	10,240	10,376	10,148	10,081 r	9,827
Indonesia	3,600	3,450	3,620	3,655 r	4,200
Iran	1,034	865	965	1,087 r	1,119
Iraq[e]	220	220	200	200	200
Ireland	458	405	410	443	400 e
Israel[3]	1	--	--	--	--
Italy	409	367	408	434	391
Japan	1,389	1,385	1,410	1,318	1,188
Korea, North[e]	100 r	100 r	100 r	100 r	100
Korea, Republic of	496	489	369 r	368 r	153
Kuwait	452	397	410	400	414
Libya	545	552	552	495	533
Lithuania	407	401	420	440	467
Malaysia	351	432	605	726	848
Mexico	1,449	1,003	701	548	537
Netherlands[e]	2,350	2,430	2,540	1,940	1,970
New Zealand	94	110	105	117	109
Nigeria[e]	168	148	--	--	--
Norway	245	122	334	323	330
Pakistan	1,797	1,999	1,884	1,966 r	1,958
Peru	15 e	--	--	5 r, e	5 e
Poland	1,683	1,474	1,862	1,735 r	1,311
Portugal	204	223	246	202	190
Qatar	1,127	1,130	1,097	1,159 r	1,166
Romania	378	686	1,016	949	930
Russia	6,500	7,633	8,735	8,690 r	8,600 e

See footnotes at end of table.

TABLE 12--Continued

AMMONIA: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons of contained nitrogen)

Country	1998	1999	2000	2001	2002
Saudi Arabia	1,418	1,402	1,743	1,774 r	1,737
Serbia and Montenegro	172	57	60 e	66	115
Slovakia	234	247	271	215	226
South Africa	723	785	560	506 r	492
Spain	460	437	442	436	415
Switzerland	31	32	33	31	33
Syria	129	112	91	138	143
Taiwan	231	146	11	--	--
Tajikistan[e]	10	10	15 r	5 r	15
Trinidad and Tobago	2,271	2,720	2,680 r	3,036 r	3,300 e
Turkey	560	82	53	67	301
Turkmenistan[e]	75	75	75	75	75
Ukraine	3,300	3,711	3,577	3,700	3,700
United Arab Emirates	331	380	348	358	364
United Kingdom	871	902	814	850	837
United States[5]	13,800	12,900	11,800 r	9,350 r	10,800 p
Uzbekistan	875	790	810	670	740
Venezuela	526 r	522	423 r	808 r	884
Vietnam	33	33 e	42	53	58
Zimbabwe[e]	57	61	58	58	61
Total	104,000	107,000 r	108,000 r	105,000 r	109,000

[e]Estimated. [p]Preliminary. [r]Revised. -- Zero.

[1]World totals, U.S. data, and estimated data have been rounded to no more than three significant digits; may not add to totals shown.

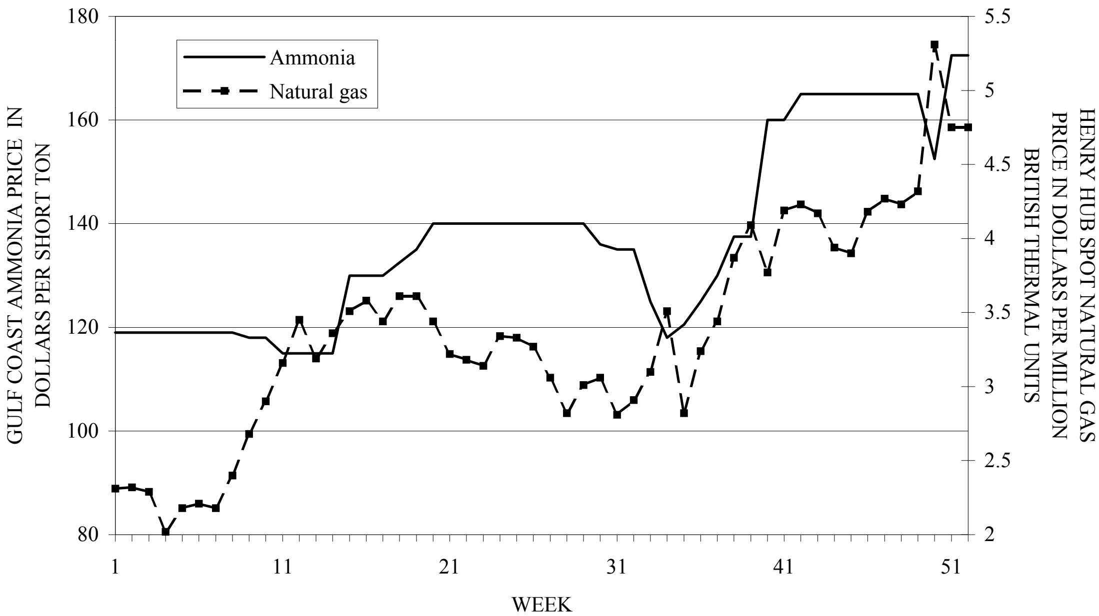
[2]Table includes data available through June 18, 2003.

[3]May include nitrogen content of urea.

[4]Data are for years beginning April 1 of that stated.

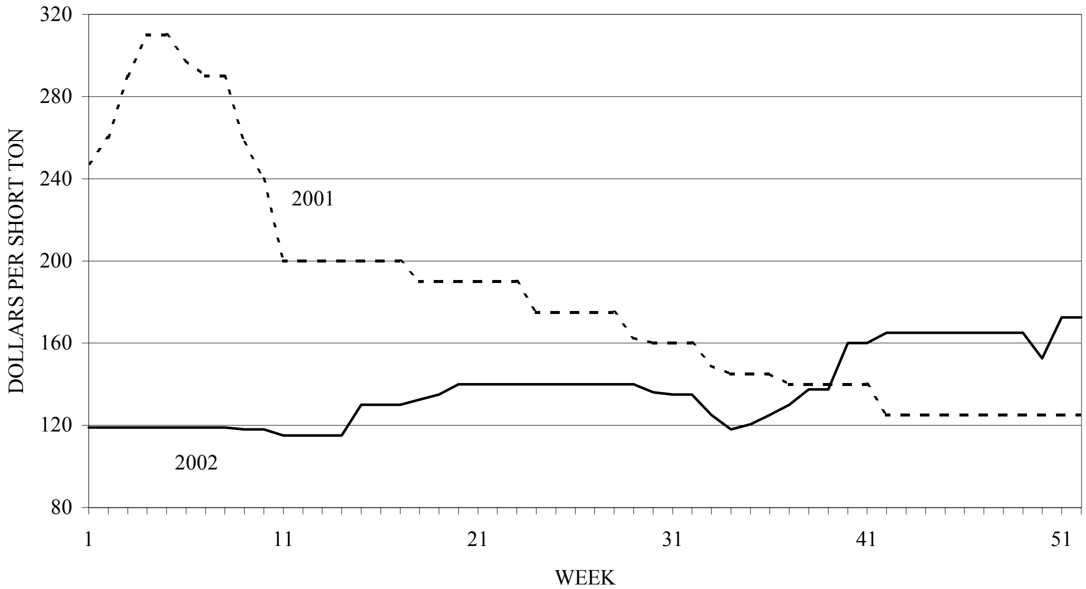
[5]Synthetic anhydrous ammonia; excludes coke oven byproduct ammonia.

FIGURE 1
AMMONIA AND NATURAL GAS PRICES IN 2002



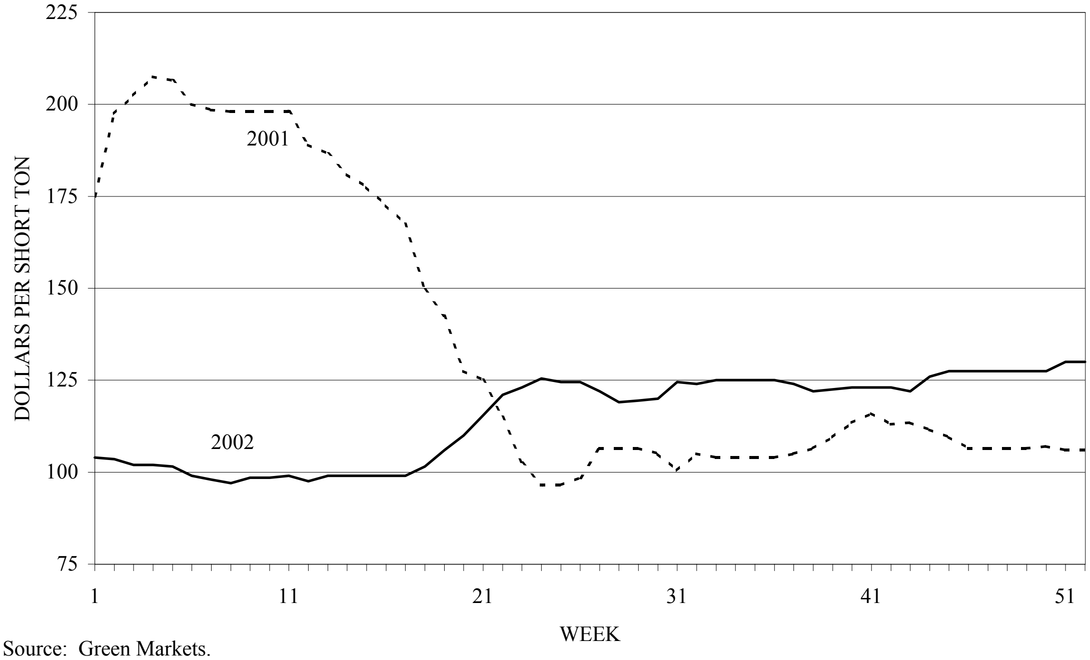
Sources: Green Markets and Natural Gas Weekly.

FIGURE 2
AVERAGE GULF COAST AMMONIA PRICES



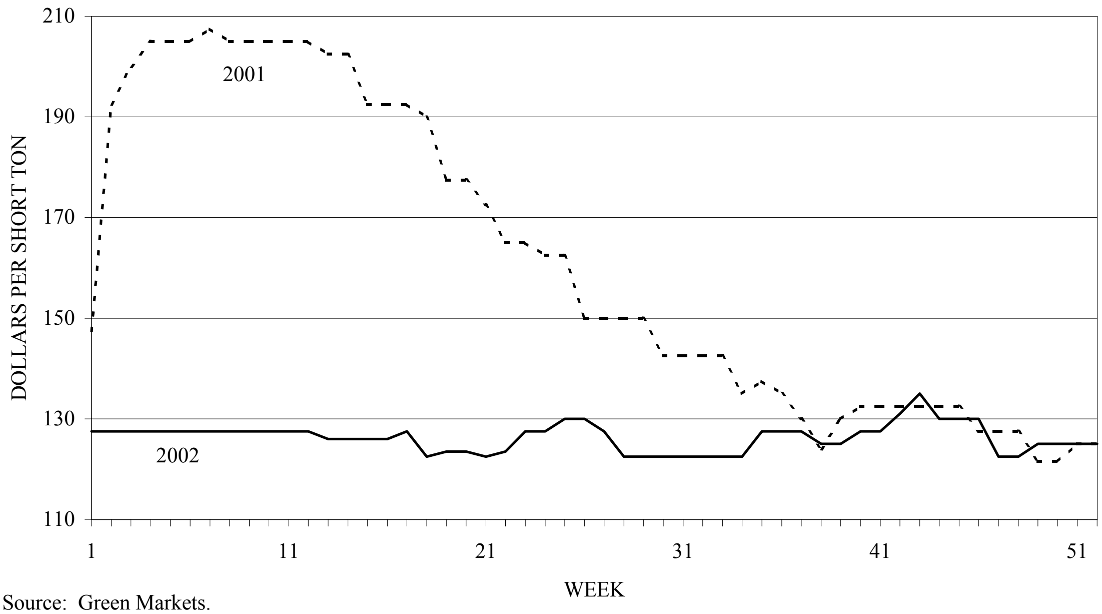
Source: Green Markets.

FIGURE 3
AVERAGE GULF COAST GRANULAR UREA PRICES



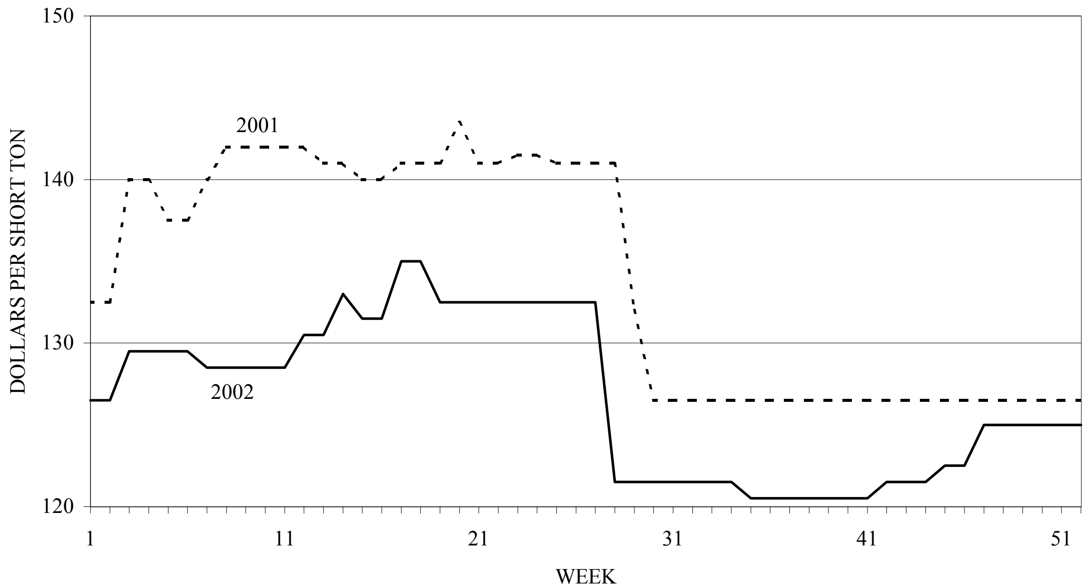
Source: Green Markets.

FIGURE 4
AVERAGE AMMONIUM NITRATE PRICES



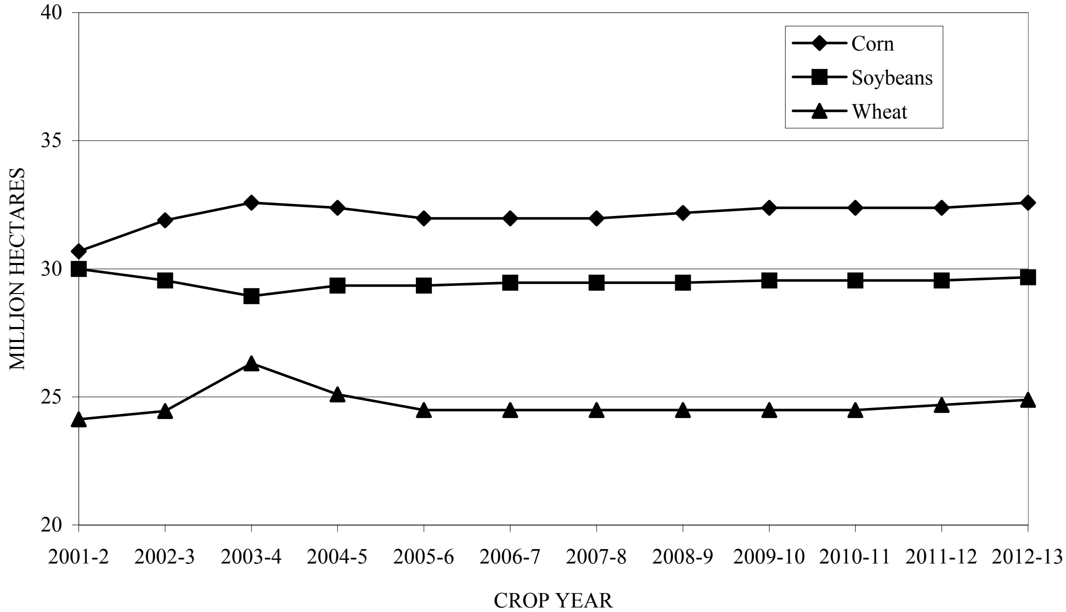
Source: Green Markets.

FIGURE 5
AVERAGE AMMONIUM SULFATE PRICES



Source: Green Markets.

FIGURE 6
PROJECTED PLANTED ACREAGE



Source: U.S. Department of Agriculture.